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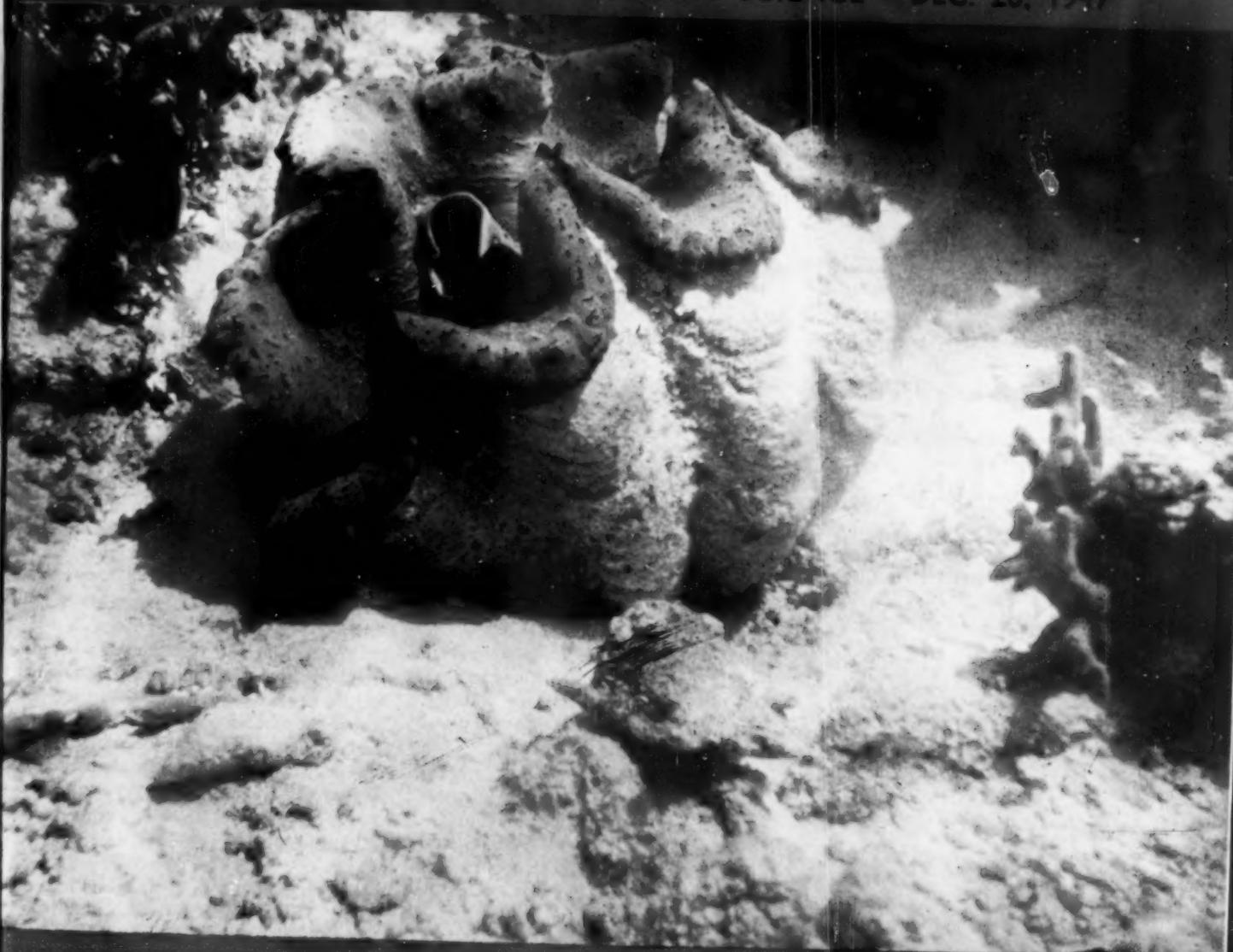
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# SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE • DEC. 20, 1947



**Man-Killing Clam**

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A SCIENCE SERVICE PUBLICATION

## MINERALOGY

# Man-Made Minerals

**Are artificially produced in the laboratory by subjecting ingredients of natural minerals to the pressures and temperatures under which they form in the earth.**

► SCIENTISTS have borrowed Nature's recipe book to make several minerals in the laboratory under the pressures and temperatures at which these minerals were produced in the earth.

Talc, the stuff that is the base of face powders and has countless other uses, was produced from its ingredients—magnesia, silica and water—in the Geophysical Laboratory of the Carnegie Institution of Washington. Drs. N. L. Bowen and O. F. Tuttle, who performed the experimental work, put a magnesium silicate, serpentine, under high water vapor pressure to produce talc.

Pressures and temperatures required to form the mineral indicated that natural talc is produced in the earth under four to five miles of impervious rock. Other natural minerals made up of magnesia, silica and water which were produced by the Carnegie Institution scientists include the olivine minerals,

forsterite and enstatite.

From this research program, disclosed in the annual report of the institution, scientists may be able to learn how natural minerals found in the earth's rocks were originally formed.

To form the minerals, the natural ingredients were put in a new, and as yet nameless, type of pressure apparatus. It is a small, stainless steel cylinder, about half the size of a lipstick container. Talc was produced in the tiny pressure device at a temperature of nearly 1,300 degrees Fahrenheit, under a pressure of 30,000 pounds per square inch. Temperatures up to 1,652 degrees Fahrenheit have been produced in the cylinder.

Other studies with the new apparatus include experiments with potassium, aluminum, silicates and granite and water.

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## ASTRONOMY

# Find Clue to Star's Speed

**Strong magnetic fields, observed for the first time in stars other than the sun, may hold the key to the speed of their rotation.**

► THE key to the speed with which distant stars are whirling may lie in the strength of their magnetic fields. Stars possessing strong magnetic fields are rotating rapidly, the research of Dr. Horace Babcock of Mount Wilson Observatory of the Carnegie Institution of Washington indicates.

For years scientists have been searching for a clue that would show them how fast a far-off star, with its axis pointing toward the earth, is twirling. In the star's magnetic field, Dr. Babcock's work suggests, lies the answer.

For the sun, the magnetic field strength is about 50 gauss and the sun's equator is known to rotate at a speed of approximately 1.25 miles a second. Early-type stars believed to rotate at exceptionally high speeds were investigated. Magnetic fields stronger than

1,000 gauss were found in several and a polar field of some 5,500 gauss was discovered in one. If Dr. Babcock's theory is correct, this star must be rotating at a terrific speed.

For several decades local magnetic fields of 5,500 gauss have been measured in sunspots, showing the fury of their activity. Dr. Babcock's investigation, however, represents the first observation of magnetic fields in stars other than our sun.

The discovery of magnetism in rapidly rotating stars may contribute greatly to our knowledge of the relationship between the magnetic and mechanical properties of large rotating masses, such as stars. It may also aid our understanding of rotating stellar systems such as the galaxy of which the earth is a part.

The controlling effect exerted by the

magnetic field of a rotating star on ions and electrons in and beyond its atmosphere may well explain the existence of equatorial rings of tenuous material found around some stars and planets. It may point the way to more complete theories of how planetary systems and double stars are created.

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## EMBRYOLOGY

# Newborn Baby Almost Three-Fourths Water

► THE newborn baby is almost three-fourths (74.6%) water. A little more than half (56.5%) of this water is in his blood and in the cells that make up his body. The rest is in the fluid lying between and about the cells and in the body spaces. But as he grows the proportion of water within the cells gets larger.

Salt, tagged with radioactive sodium, and heavy water led to these discoveries in studies by Dr. Louis Flexner and associates at the embryology department of the Carnegie Institution of Washington.

These are the first such studies made on newborn babies, though a number have been made on grown persons.

The radioactive salt, which was too slightly radioactive to cause any damage to the baby, was dissolved in water containing deuterium oxide, or heavy water. This was injected into one of the baby's veins. Two and one-half to three hours later a sample of blood was drawn from a vein. This interval was known to be long enough for the water and salt to be thoroughly distributed throughout the body.

The heavy water goes everywhere in the body along with ordinary water. The salt goes into all the fluid outside the cells but not into the cells. Having a larger space to fill than the salt, more of the water, proportionately, than the salt leaves the blood.

So the blood sample after three hours has lost more of the heavy water than of the tagged salt. The difference tells what proportion of the water has gone into the cells. The degree to which the heavy water in the blood becomes diluted with ordinary water, exchanging with it from the body tissues, tells how much of the body is water.

Dr. Flexner's findings, made on healthy, living infants, agree with those of other scientists made on stillborn babies by other methods.

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## MEDICINE

# Sex Hormone for Cancer

New treatment of the disease is going to be tried in cancer clinics throughout the country under A.M.A. sponsorship. Still in experimental stage.

► A NEW way of treating cancer is going to be tried on a large scale by cancer clinics all over the country under the auspices of a special committee of the American Medical Association.

The treatment consists in the use of sex hormones. Several hundred patients with advanced cancer of the breast have already been treated with female sex hormones. Several score with cancer that spread to the bones from the breast have been treated with male hormone. And men with cancer of the prostate gland have been helped by castration and by treatment with female sex hormones.

The hormone treatment of breast cancer has not yet shown signs of being a cure. But in some cases it relieves symptoms and may prolong life. Doctors are eager to use this new treatment for their patients whose breast cancers have gone beyond the stage where operation will help.

But indiscriminate use of the hormones is dangerous. In some cases, female hormones speed the rate of growth of the cancer. Patients with cancer that has spread to the bones and who have a lot of calcium in their blood have been made very ill by the male hormone treatment that has helped others.

The treatment is still in the experimental stage. But by the proposed trials of it on large numbers of patients with careful records to be impartially judged, it is hoped that its exact place in the fight against cancer can be learned. Some breast cancer patients will be helped now. Many more, with other kinds of cancers, may be helped in the future because, the committee hopes, the studies will tell more about the part hormones play in cancer. Such information could lead to a basic attack on cancer either through better treatment in early stages or through prevention.

Five firms have offered to supply substantial quantities of male hormone for the studies. Others are considering participation in the project.

The cases under treatment will be reviewed by two groups of consultants. One of these will be a group of X-ray specialists who will study and evaluate

X-ray pictures of all patients before and after hormone treatment. The other group will be pathologists who will study specimens of the cancers themselves, before and after treatment, to give their independent verdict on the

## AERONAUTICS

# Jet Plane Folds Its Wings

► A NEW jet-propelled carrier-based fighter plane for the U. S. Navy has had its first flight test at the Long Island plant of the Grumman Aircraft Engineering Corporation at Bethpage, N. Y. It is a fast plane, with folding wings, and especially designed for take-off and landing on a short runway.

In general appearance the new plane, which will be known as the Grumman XF9F-2 Panther, resembles other familiar jet fighters except for its short square-tipped wings which fold for shipboard storage. The movable leading edge of the wing, which moves in conjunction

with the wing flaps in landing and take-off, provides improved stalling characteristics and added lift.

Chairman of the committee in charge of the trials is Dr. Ira T. Nathanson, of the Massachusetts General Hospital, Boston. Other members are: Dr. Frank E. Adair, Memorial Hospital, New York; Dr. Willard M. Allen, Washington University School of Medicine, St. Louis; and Dr. Earl T. Engle, College of Physicians and Surgeons, Columbia University, New York.

*Science News Letter, December 20, 1947*

Wood deep under water may last for hundreds of years unless eaten by sea worms.



**CARRIER-BASED JET**—To be known as the Grumman XF9F-2 Panther, it resembles other jet fighters except for its square-tipped wings which fold for shipboard accommodation. It will be the first jet-fighter which can use either of two engines—the Rolls-Royce Nene engine or the Allison turbo-jet engine.

has since been beaten by the Navy Douglas Skystreak travelling at 650.6 miles an hour.

The Navy plans to use both of these engines in future Panthers, and although not identical they will be interchangeable.

#### Astrology

## Water Can Make Rain Fall

**Common cumulus clouds of any temperature will precipitate in a "chain reaction rainfall" when sprinkled with water.**

► WATER, of all things, can be used to make rain fall. This latest and ironic development in rain-making was reported in a communication to the National Academy of Sciences by Dr. Irving Langmuir, associate director of the General Electric Company's Research Laboratory.

He advanced the theory that a little water dispensed on the right kind of cloud at the right time under the right conditions would start what the scientist termed a "chain reaction rainfall." Water, instead of the dry-ice or silver iodide used in earlier experiments, would trigger rain from common cumulus clouds, a type of heaped up white cloud found over the South and Pacific coast regions throughout the year and over the Northeast commonly in the summer.

"Theoretically," Dr. Langmuir told fellow scientists, "a single drop of water, if dispensed in the right spot, would be sufficient to cause the chain reaction rainfall."

Unlike the dry-ice experiments, water could set off precipitation from cumulus clouds of any temperature. In order to produce rain with water on a cumulus cloud, the cloud must have a vertical, upward current of at least five miles per hour, contain fully-grown water droplets, a high water content and a thickness of several thousand feet.

Under the new theory, the falling water particles would grow as they fell through the cloud until they reached a critical size of about three-sixteenths of an inch. After that, the particles would shed smaller bits of water which would be carried back into the cloud until they grew big enough to fall.

Dr. Langmuir said he believes this type of rain-making has already been achieved. He developed the new theory from reports of unexplained rain in some of the dry-ice experiments. In some cases, he explained, ordinary ice

able. The plane will be the first jet fighter with a dual source of engines. This is to assure an uninterrupted engine supply and will tend to make lower production costs.

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particles on the dry-ice probably melted to set off rain under conditions where dry-ice alone should not have produced any precipitation.

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#### Astronomy

### Discover Huge New Comet From Ship in Pacific

► A HUGE comet streaking across the southern sky just after sunset, trailing a tail estimated to be 40,000,000 miles long or the length of the whole Big Dipper, was discovered Dec. 8 from a ship at sea in the Pacific.

Exact measurements of the position of the comet were hard to make because when discovered it was low in the sky and no bright stars were nearby.

The first magnitude object, bright as Halley's comet last seen in 1910, has not yet been named officially other than comet 1947n. Comets usually bear the name of the person or persons who first find them. This one was discovered by someone as yet unidentified. It may be known as "Comet Ship."

*Science News Letter, December 20, 1947*

#### Chemistry

### Ammonium Sulfamate Made More Easily

► AMMONIUM sulfamate, one of the sensational weed-killing chemicals born of the wartime emergency, is manufactured in a more direct and economical way under a new procedure on which U. S. patent 2,426,420 has been issued to Ernest J. Tauch of Cleveland Heights, Ohio.

The method is an improvement on an earlier German process which was largely a failure. Theoretically, ammonium sulfamate should result directly when ammonia and sulfur trioxide are

mixed. In the German process this was attempted with both compounds in the gaseous state, but the reaction produced unwanted ammonium imidodisulfonate instead. By mixing an excess of liquid anhydrous ammonia with sulfur trioxide in either liquid or solid form, Mr. Tauch has been able to obtain the desired compound. Care must be taken, he states, to make the mixing rapid and thorough, and to get rid of the heat evolved in the reaction. Evaporation of the excess ammonia helps accomplish this.

Patent rights are assigned to E. I. du Pont de Nemours and Company, sole manufacturers of ammonium sulfamate, who market it under the trademark "Ammate".

*Science News Letter, December 20, 1947*

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## GENERAL SCIENCE

# Science Review for 1947

**Nature of smell, change of proton to neutron, printed circuit radio and man-made rain are among the most important discoveries of the year.**

This summary of the year's happenings in the world of science is limited by space to just the highlights. Most of the events are described in detail in the pages of the SCIENCE NEWS LETTER for the current year. If you wish to refer to any particular report, you may find it readily through the index. (See SNL, June 28 and also the issue which will appear next week, Dec. 27).

By SCIENCE SERVICE STAFF

► DISCOVERY that the sense of smell operates through odoriferous substances filtering out heat rays inside the nose may be ranked in future years as the top science achievement of 1947.

The successful use of streptomycin against some kinds of tuberculosis was an outstanding medical advance, while the outbreak of cholera in Egypt was a warning that epidemics are still a world menace.

In aviation, the push-button Atlantic round trip of a plane unpiloted by human hands gets top billing, while the trial flights of jet-propelled bombers of great size and the undoubtedly unannounced advances in guided missiles of a major sort are important military science developments.

Sunspots were more plentiful than they have been for 100 years and their cycle came to a peak. The great mirror of the 200-inch telescope was carried to Mt. Palomar, Calif., and soon will see farther into space.

Artificially-made long chains of protein molecules gave promise of new developments in medicine and plastics, possibly explaining some living mechanisms.

In the new highest voltage atom smasher at Berkeley, Calif., proton and neutron were turned one into the other; a new array of light isotopes were created and new elemental transmutations accomplished.

Evidence grew for existence of man in America 10 to 20 millenia ago, and a 10,000-year-old human skeleton was found at Tepexpan, Mexico.

Radio sets, hearing aids and other electronic devices using war-developed miniature tubes and printed wire circuits appeared.

Man made rain on a limited scale by

sprinkling solid carbon dioxide or even water on clouds, and hope increased that something might be done about the weather.

Disordered agricultural production and crop failures, including the bad USA corn year, caused a world food crisis. Foot-and-mouth disease in central Mexico posed the most serious menace to livestock in North America.

Military applications of science in the unified defense establishment were reinforced and accelerated by a new research and development board, while the civilian national science foundation again failed to be created.

## AERONAUTICS

## Plane Crossed Atlantic Without Hands at Controls

PUSH-BUTTON flying enabled an Air Force plane to cross the Atlantic and land without human hands touching the controls.

New official world record of 650.6 miles per hour was set by Navy pilot flying a Douglas Skystreak; an Air Force B-29 Superfortress flew 8,854.8 miles to beat the international closed course distance record.

Speedy Navy transonic Skyrocket plane, powered with both turbo-jet and rocket, was designed to fly 760 miles an hour.

A flying-wing Air Force bomber, with eight jet-propulsion engines and without tail or fish-shaped body, flew successfully.

An engine trouble analyzer was developed to enable the engineer to locate during flight improper operation that might cause engine stoppage.

Photoelectric instrument was developed to record automatically the cloud-height over airports; visibility-measuring device was designed to aid landings at airports; portable device accurately indicated wind speed and direction, important in airplane take-off.

Very high frequency navigation receivers for airplanes were developed for use with VHF radio ranges, static-free guide paths to their destinations.

Two new devices showed tower-control operators the exact position of an approaching plane and its altitude; fog dispersal system was used to aid instrument landing systems; television and radar were combined in an aircraft navigation and landing aid; 15-pound radar equipment warned pilots of too close approach to earth.

Lights producing flashes strong enough to penetrate any weather for at least 1,000 feet were developed to aid airplane landings; lighting system for small-town airfields was made to be moved with change in the wind.

Two supersonic wind tunnels were com-

pleted to create conditions met at altitudes of 50,000 feet to 100 miles; system of 10 chambers was devised for studying the effects of weather on aircraft accessories; hangar that simulates extreme weather conditions encountered in operation was developed for testing new aircraft and equipment; air eddies were eliminated in wind tunnels by use of improved fine screens.

One-ton monoplane for Army liaison work, designed to clear a 50-foot obstacle within 600 feet of take-off, has a passenger-carrying boat-shaped body for pilot and observer suspended below the wings and forepart of the boom.

Glider that discards wings and tail when it lands upon the water, and like a motorboat is powered by a small gasoline engine, was designed for use in shipwreck rescue.

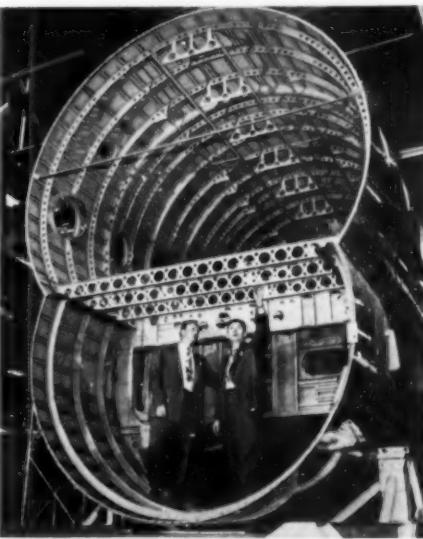
The Air Force XB-47, a six-jet engine bomber, incorporates swept-back wings and tail surfaces that are ultra thin.

Speedy combat aircraft, Navy XF2R-1, has a gas-turbine engine in front and jet-propulsion engine in the rear.

Men cleared the tail of a speeding jet plane by being shot from the cockpit at a velocity of 60 feet per second.

Parachute of criss-crossed wide fabric ribbons safely lowered to the ground a jeep and howitzer at the same time.

A tractor-track of the endless belt type, installed on the landing gear of heavy Air Force cargo planes, was found practical for landing on soft dirt, mud or sand; inter-



**TWO-STORY AIRLINER**—Shown in the process of construction is this 67½ ton sky giant, the Boeing 377 Stratocruiser. A fleet of these will be used for 340-mile-an-hour coast-to-coast and Pacific Coast-Honolulu service. Accommodations for 55 passengers will include stateroom and sleeper facilities, lounges, food galley and bar. It will also carry 8,000 pounds of cargo.

changeable landing wheels, skis and floats permitted a plane to land on earth, snow or water.

Air Force helicopter with overlapping rotors was designed to carry pilot, co-pilot and 10 passengers; Navy 10-passenger helicopter, with fore and aft rotors, was accepted by the Service.

The Banshee, powerful single-seat Navy fighter capable of flying 600 miles per hour and climbing 9,000 feet per minute, successfully passed flight tests.

Airplane noise nuisance was decreased by use of propellers with an increased number of blades rotating at lower speeds than usual.

Transcontinental Racon-route, system of short-range aerial navigation utilizing radar, was installed to enable pilots on the route to determine their exact positions at all times.

Air Force XC-99, designed to carry a load of 100,000 pounds or 400 passengers, passed ground tests.

Hughes' giant eight-engine flying boat, with a wingspread of 320 feet, made successful flight.

Engine exhaust gases, which contain too little oxygen to support combustion, were successfully used in the vacant spaces inside and around fuel tanks as fire protection.

Glass that conducts electricity, and thus can be electrically heated to keep it free of ice, was installed in control cabins of the giant Stratocruiser.

Helicopters were put into regular service to shuttle passengers from suburban cities to mainline airports used by long-range transports.

Flying tanker refueled an airliner in flight within 20 minutes in attempt of British to extend range of airliners.

#### ANTHROPOLOGY AND ARCHAEOLOGY

### Ancient Javanese Skull Collection Now Complete

COLLECTION of 11 fossilized human skulls, at least four times as thick-walled as modern man's, representing a people with bulging beetle brows who lived in Java over a third of a million years ago (*Homo soloensis*), was made complete with return of one missing member taken as war booty just after their discovery.

Almost complete lower jaw of a large ape-man with incipient chin, oldest human-like skull with stuck-out chin, was found in a cave at Sterkfontein in South Africa near skull of toothless elderly female, lacking lower jawbone, with brain capacity about equal to those of present-day large apes and only a third that of modern humans.

Crude stone implements unearthed in Nebraska associated with animal bones suggested that men camped there 20,000 to 35,000 years ago; no human skeletal remains were found.

Remains of America's earliest known human being, with age estimated at 10,000 to 15,000 years, were discovered in Tepexpan, Mexico, through use of geophysical prospecting methods, and brought to Washington for restoration.

Discoveries at Mersin in southeastern Turkey showed a chalcolithic or "copper" age transition period from late stone age to bronze age.

Monumental architecture from early prehistoric ages, probably well before 3,000

B. C., was found in southern Iraq at the site of Abu Shahraim excavations.

Complex structure assumed to be the burial place of a Hittite king, containing evidence of elaborate funerary rituals, was investigated at Tell Atchana in the Hatay area of Turkey.

Eleven heretofore unknown Mayan temples, dating from 495 to 672 A. D. and regarded by archaeologists as most complete find of recent years, were discovered.

Indians with features characteristic of the general American Indian neighbors of first New England settlers were reported living on Martha's Vineyard island off southern coast of Massachusetts.

U. S. Government entered archaeology on a national scale by initiating a survey of all archaeological sites on rivers where dams are to be built or other major changes undertaken.

#### ASTRONOMY

### Find Sun Has Regions of Unsuspected High Energy

BROAD, fuzzy absorption line of the sun's spectrum was found to be identical with the red "coronium" spectrum line seen during solar eclipse; this indicated that the sun has regions of much higher energy than previously suspected.

A gigantic sunspot, easily visible through smoked glass, lived to be seen during four rotations of the sun; more sunspots were seen during May than in any month for more than 100 years.

Light and dark patches bearing some resemblance to sunspots were observed on a distant star; this is the first time surface features of any star beyond the solar system have been reported.

Mars' atmosphere contains an appreciable quantity of carbon dioxide, even a larger percentage than is in the earth's atmosphere, spectrographic study of infrared sunlight reflected by the planet indicated.

New comets Rondanina-Bester, Becvar, Bester IV, Jakovin, Wiranen, Reinmuth, Bester V, Honda and 1947N were discovered; comets Grigg-Skjellerup, Faye, Whipple, and Encke were rediscovered.

Giant 200-inch disk, successfully ground, was moved to Mt. Palomar to be installed in its dome and project man's sight into the universe two times further than ever before.

A nova or "new" star was spotted by photography in the constellation of Sagittarius.

A star was found to be rotating rapidly with its axis pointing toward the earth when the lines of its spectrum are not broadened but split into two components due to the effect of the star's strong magnetic field.

A negative correlation was found between size of meteorites and helium content, indicating that accurate estimate of the age of a meteorite cannot be based on helium content alone.

Both red and blue members of Antares, giant red star, were found to be surrounded by an enormous cloud of iron particles existing as extremely minute solid particles instead of in gaseous form.

Production of artificial meteors, created by shooting swarms of iron missiles from V-2 rockets in flight, was attempted to aid study of ionization that affects long-range radio transmission.



**ANCIENT CAMP SITE—A 20,000 to 35,000-year-old campsite is being attacked with picks and shovels to uncover more traces of the semi-nomadic hunters who were America's oldest known inhabitants. The site is at Lime Creek, Nebraska.**

Radar bearings on the sun indicated that the cosmic radio noise originates from long, thread-like prominence filaments that surge into the sun's outer regions.

Total eclipse of the sun on May 20 was recorded by several expedition groups to Brazil, where totality lasted almost four minutes; changes in ionized layer of earth's atmosphere, displacement of stars close to sun, moon's shadow and cosmic rays were studied during totality.

The sun is producing much more energy than is currently believed, study with a sky-observing variation of the snooper scope indicated.

A cloud of gas, dust and cosmic debris, that while in the process of collapsing clashes with another cosmic cloud, might give rise to a solar system with planets, it was suggested; planets thus created would move with circular orbits close to the star's central plane, the largest masses remaining farthest from the sun.

Stages by which stars are built up were reported: individual atoms stick together to form small solid grains, these cosmic grains are molded into clouds by force of radiation pressure, clouds condense to form small dark nebulae that upon compression heat up to become stars.

Cosmic dust is created by condensation, it was reported, every gas atom in interstellar space freezing onto the solid particle which it strikes.

Cloud of cosmic dust between us and stars in the region of the Great Rift in the constellation of Cygnus was stated to decrease the light of the stars a hundred-fold.

Light from white-hot stars was reported to receive a red tint from the tiny particles of interstellar dust through which it passes.

Use of photocells sensitive to red light far beyond the region visible to the human eye

made possible study of atomic lines in infrared solar spectrum, determination of infrared absorption by matter between the stars in the Milky Way and measurement of brightness of stars by day.

New tunable filter showed speed with which gases on the sun move toward us and made it possible to calculate the actual position of these fiery prominences in relation to the sun; a machine was developed to find a star on a photograph and measure its brightness.

New minor planet was discovered following inauguration of world-wide program for study of asteroids.

#### ATOMIC POWER

### Exchange Forces Found In Nucleus of Atom

PROTON, heart of the hydrogen atom, and neutron, trigger of the atomic bomb, were found capable of turning one into the other through exchange of the identifying electrical charge.

Twin or isotope of element 87, francium, was found to turn into astatine, another rare element, after existing only five minutes; neutron bombardment of hafnium produced a new isotope of that element with a half-life period of ten minutes.

Fission, originally confined to heaviest elements, was caused in atomic nuclei as light as tantalum, element 73, by ultra-high energy atomic bullets fired by a giant cyclotron; nuclei of platinum, lead, bismuth and thallium were also split.

Thirty-four different elements were detected among the fission products of atomic-bomb uranium; neodymium, barium, zirconium and molybdenum were found to account for nearly half of the weight of the uranium split asunder.

Elements were transmuted 16 steps down the periodic table and 22, possibly 30, particles were knocked out of an atomic heart.



**IGNORING ATOMIC EXPERIENCE**—These are living sea cucumbers, known as holothurians, on the ocean bottom directly under where the bomb exploded at Bikini. The mud where they are living was highly radioactive and still is somewhat.

or nucleus with the new 4,000-ton synchrocyclotron.

An apparatus which turns the nucleus of an atom into a miniature radio transmitter sending out a signal that identifies the chemical element was developed on an experimental scale.

Atomic energy pile using plutonium without a moderator, activated by fast neutrons, was devised to release energy slowly.

Bevatron, atom smasher that can speed up electrons to a billion electron volts, was designed.

Photograph was taken of an elusive subatomic particle, the mesotron, that lived only a fraction of a second and then disintegrated; the mesotron is 200 times as massive as the electron and the neutral particle resulting from its disintegration has a mass 50 to 60 times that of the electron.

Three of the four unnamed chemical elements were christened: 43, first artificially-made element, is called technetium (Tc); 85 is given the title of astatine (At); 87 is named francium (Fr); 61, known as illinium, is being investigated to determine whether that obtained from the atomic pile is identical with the naturally-occurring element announced two decades ago.

Long-life radioactive iodine was produced by bombarding the chemical element tellurium.

Improved method of separating carbon of atomic weight 13, useful in medical, biological and industrial research, consists of distilling carbon monoxide over a large-area column into liquid nitrogen as a cooler.

Visible light was found to be given off by moving electrons in a 70,000,000-volt synchrotron, and the electron beam was made visible by its own light.

Three major Atomic-age research developments were: establishment of biological laboratory at Oak Ridge, Tenn.; founding of three regional institutes for nuclear studies; first sales of radioactive isotopes.

ALSOS report showed that an American scientific mission preceded troops into Germany and found that Germans, although working on an atomic pile, had missed the discovery of how to make an atomic bomb.

Heaviest and most violently radioactive of the chemical elements, curium (no. 96), was isolated in sufficient quantity to be barely visible to the unaided eye; it glows brightly enough to be photographed by its own visible light.

Chlorine, common salt element, was changed by exposure to neutrons in the atomic pile to a radioactive form which will continue to give off radiation for more than a million years.

#### BIOLOGY

### 4-Day-Old Human Embryo Obtained for First Time

HUMAN embryo only about four days old was the first and only authenticated one obtained before attachment to the uterus in the mother's body.

Before birth, superior babies-to-be were successfully transplanted into mother rabbits of just ordinary breeding.

Some hereditary traits were declared to pass from one generation to another by means of plasmogenes, carried in the general protoplasm of the cell rather than as genes in or

on the highly specialized little nuclear rods and spheres known as chromosomes.

Changes in the chromosomes of developing male sex cells of plants were produced with radioactive phosphorus taken up in water absorbed by the plants.

Guppy-like fish known as *Mollienesia formosa* were reported to have only one sex—female.

Many cities were made virtually flyless by combined clean-up and DDT-spraying campaign.

Outbreak of hoof-and-mouth disease in central Mexico seriously menaced livestock industry in the United States, especially after authorities abandoned eradication by slaughter and burial.

Tristeza or quick decline, disease of orange and grapefruit trees, was found due to a microscopically invisible, filter-passing virus; in South America and Australia the disease spreads more rapidly from tree to tree than in California.

Weed-killing chemical, 2,4-D, was found to kill plants by robbing them of ability to utilize oxygen in their life processes; onion juice mixed with 2,4-D boosted its weed-killing capacity from 10- to 20-fold; ultraviolet radiation changed its plant-killing power.

HET, newest terror to bugs, killed red spiders and red mites; methoxychlor, close chemical relative of DDT, was reported only one-fortieth as poisonous to man and warm-blooded animals; benzene hexachloride, British insecticide, before killing, deprived single-celled animals of their power to divide; bladin, German-produced insecticide, was tested as a DDT supplement.

Radioactive tracer atoms were used to chart accurately the course of one of the new plant-killing chemicals from the spot where a small quantity is placed on a bean leaf, down the stem and throughout the rest of the plant.

Sugar formed in one leaf of a large sugar-cane stalk during one hour's work in the sun was distributed to all parts of the 11-foot, seven-pound stalk within three days, use of carbon atoms tagged with radioactivity showed.

Oxygen absorbed by a plant along with carbon dioxide becomes part of the plant structure, while oxygen that goes in as part of water is excess and comes out again as pure oxygen, it was demonstrated through use of heavy oxygen of atomic weight 18.

By use of radioactive carbon 14 it was discovered that carbon atoms do not linger long in the simple acids and sugars into which they are first built by green plants, but within the first hour are to be found in the more elaborate molecules of cellulose, lignins, carotinoid pigments, amino acids and proteins.

Radioactive "tag" was given to tobacco mosaic, disease-causing virus, by inoculating the virus into tobacco seedlings which were then fed with radioactive phosphorus as part of their mineral nutrient solution.

Early history of copper in the bodies of cattle was studied by the radioactive tracer method, which revealed the heaviest concentration is in the liver.

Fertilizer needs of plants were studied with radioactive phosphorus.

Chlorophyll, green plant pigment that lays the foundation of all foods, was found through use of radioactive carbon of atomic weight 14 to do its work in a two-stage proc-

ess, one stage being carried on in the dark. Chromosomes, heredity-controlling structures, were successfully photographed with an electron microscope.

An enzyme, phosphoprotein phosphatase, was discovered which liberates phosphorus from protein in the eggs of frogs so that the embryo can use the phosphorus in its development.

Cells do all their growing in the immediate neighborhood of their nuclei, then the new-grown living substance migrates to the outside of the cell, study of nerve fibers indicated.

British-originated chemical, isopropyl-N-phenyl carbamate (IPC), proved successful in conquering quackgrass.

DDT stopped the powder-post beetle that damages bamboo and killed the bark beetle that carries elm disease fungus; it protected fruit against damaging insects; warning was issued that DDT be used with care as it can also kill insect friends, and harm small birds, pets and even man.

Rubber trees immune to destructive leaf-spot disease were introduced into cultivation.

Announcement was made of a strain of chickens genetically resistant to range paralysis, destructive virus disease.

Hens lay eggs according to when they get fed rather than according to time of daylight, experiments showed.

Substance that checks growth and one that speeds growth were found in sugarcane.

Minute virus particle was found to kill a bacterium by stealing its phosphorus.

Bacterial strains that resist action of penicillin, streptomycin and other antibiotics were shown to result from rapid evolution or mutation, and not merely a survival of the toughest or selection of resistant cells already there.

Infant orchid plants that grow but never grow up were produced by "doping" them with barbiturate drugs.

Better yields of turpentine and rosin were obtained by inoculating pine trees with spores of a disease fungus when they are tapped.

Heat-treated corn seedlings were found to grow up into plants unable to produce fertile pollen.

Podophyllin, resin extracted from rootstocks of mayapple plant, was found to have the colchicine-like effect of stopping cell division half-way and thereby producing giant varieties of plants.

Too little sleep for too many nights was discovered to retard the growth of white rats and make them highly irritable, but not to impair their ability to learn.

Evolutionary jumps or mutations in mice were produced by a chemical compound, methylcholanthrene.

Eelgrass, chief food of many coastwise wildfowl, was reported to be increasing rapidly after almost being exterminated 15 years ago by a fungus disease.

Living pines of a supposedly extinct species were found to be natural hybrids.

Redwood trees identical with fossil remains of an ancient redwood genus that once grew in the entire northern hemisphere were discovered in central China.

Blood bank for valuable horses, cows and dogs was opened.

Living organisms, viruses and vitamins were sealed in carefully-labelled glass tubes to be opened for research purposes two centuries from now.

Army's soilless gardens produced millions of pounds of vegetables in Japan.

Treatment of seeds with solutions of salts of radioactive elements, and use of such salts along with fertilizer in the soil, was claimed to cause increased yields.

Birds have a state resembling hibernation, observations of many scientifically trained persons indicated.

#### CHEMISTRY AND PHYSICS

### Printed Circuit Radios Made in Calling-Card Size

WORLD'S smallest radio station, complete with tube and circuit that fits in an empty lipstick case, and tiny four-tube radio, calling-card size, proved successful; they utilize the war-developed technique of printed circuits.

Radio tube the size of a rice grain was developed.

Transparent plastic, known as NBS casting resin, was announced as war-developed to shield delicate tubes and circuits without interfering with operation of electronic equipment.

Female sex hormone, effective in small amounts, was concocted artificially from simple, cheap chemicals; it can be given by mouth to relieve women undergoing the difficult transition associated with middle age.

Fibrous protein molecules as complex as those in the human body and other living structures were synthesized, and protein molecules were induced to join one to another in long chains in much the same way that hydrocarbon molecules polymerize to form synthetic rubber.

New scientific terms proposed include the "nuclide," defined as species of atom characterized by the construction of its nucleus, particularly the number of positive electrical units and neutral particles in the nucleus of the atom; and "langley," defined as amount of solar radiation received on one square centimeter, capable of raising the temperature of one gram of water one degree Centigrade.

Neutral meson, sub-atomic particle that lives but one ten-quadrillionth of a second after creation by bombardment from outer space, was declared to play a major role in the creation of cosmic rays.

Cosmic rays were found constantly to create radioactive carbon, present in living organisms and recently dead organic matter.

Sensitive radar was used to detect electrical bursts from energetic cosmic rays.

Diamonds, size-for-size, were found to be a thousand times more sensitive detectors of alpha, beta and gamma rays than the counters ordinarily used.

Synthetic stones, far more brilliant under electric light than in daylight, were made from titanium oxide: star sapphire was made from aluminum oxide.

Gem stones were given the color of more valuable stones through X-ray treatment, but heat or sunlight brought them back to their normal color.

Light was utilized to turn petroleum compounds into synthetic rubber, vapors of such metals as zinc, cadmium and mercury being used as catalysts.

Nylon plastic was synthesized from corn-cobs and oat hulls instead of coal, air and water.

Synthetic compounds with much the same

effects on bacteria and fungi as natural antibiotics were created; most powerful, acrylophenone, has drawback of being only slightly soluble in water and closely related to another compound highly poisonous to animals.

Tyrosine, fundamental body chemical, was synthesized with radioactive carbon; radioactive tyrosine may disclose why potatoes and apples turn black, and help solve some of the mysteries of "black" cancers.

A new chemical, lithium aluminum hydride, was revealed as a reducing agent for highly stable organic compounds.

Noble prize in physics was awarded Sir Edward Appleton of Britain's Department of Scientific and Industrial Research for pioneer work on the ionosphere; Sir Robert Robinson of Oxford University won the chemistry award for research on alkaloids.

#### EARTH SCIENCES

### 70 Major Earthquakes Recorded on Seismograph

THERE were 80 earthquakes of sufficient strength to record themselves on distant seismograph instruments so they could be immediately located, and no less than ten occurred during the eight days after Aug. 26; one on Nov. 1 in Peru caused considerable loss of life and property damage.

Remains of the salamander-like stereospondyls, highest type of vertebrate life known during transition period from Age of Fishes to Age of Reptiles, were found in New Mexico as part of a total find of 35 skulls of animals that roamed the earth 150 million years ago.

Fragments of pelvis, jaw and skull found in Arizona were believed to be those of Chirotherium or "hand animal," dinosaur's granddaddy, which dominated the world from about 150 to 200 million years ago.

Nearly-complete fossil skeleton of an extinct Eocene mammal named Meniscotherium was discovered in New Mexico; this animal living 60 million years ago may prove to be the ancestor of modern hyraxes or Biblical "conies."

X-rays were used to bring out fine details of bony structure of small fossil fish found embedded in shale.

Underground burning of coal beds long ago was held responsible for certain clinker-like rocks and red beds found in Powder river basin in Wyoming and adjacent areas.

Systematic exploration of world's longest mountain range, the submerged Atlantic ridge that extends almost from pole to pole, was begun.

Mud on the ocean bottom is 9,000 feet thick in places, echo-sounding survey indicated.

Flat-topped mountains that dot the bottom of the western Pacific were described as stumps of volcanoes that became submerged more than half a billion years ago; new chart of Pacific ocean bottom showed a 40,000-foot difference in elevation between bottom of Mindanao trench and tops of highest mountains in the eastern Philippines.

Pacific shoreline once stood along a line running from western Montana to El Paso vicinity, studies showed.

Weather on the ground was reported to come from great whirling eddies cast off from a vast air-river ten miles up, flowing from west to east around the earth with speeds up

to 200 miles an hour.

Man-made earthquake was created by a blast of 4,600 tons of high explosive set off at Helgoland, and vibrations of the blast were recorded on 18 seismographs along a line from the North Sea to the Adriatic.

Volcanoes that erupted include: Mayon volcano in the Philippines, Akutan volcano in the Aleutians, Sicily's Mount Etna, Mount Hekla in Iceland, the Nicaraguan volcano Cerro Negro, and Mount Asama in Japan.

Strangely-colored, never-freezing lakes similar to some in Yellowstone National Park were spotted in Antarctica.

Plans were completed for a World Meteorological Organization to replace the old but unofficial International Meteorological Organization.

Torrential rains in June caused Mississippi and Missouri rivers and all their northern tributaries to go on a ruinous rampage; hurricanes in September devastated parts of Florida and Louisiana.

#### ENGINEERING AND TECHNOLOGY

### Dry Ice Seeding of Cloud Makes Rain and Snow

MAN-MADE snowfall and rain, produced by seeding a supercooled cloud with dry-ice fragments, pointed the way to possible artificial climate changes that might result in less severe thunderstorms, elimination of hail and airplane icing; water seeding was also proposed for making rainfall.

One-step camera produced a finished, dry picture and completely developed negative in one minute; heavy-weight camera for reconnaissance work showed pairs of photographs one minute after they were snapped.

Laboratory camera for taking and developing research pictures was announced; matchbox camera and vestpocket darkroom were devised for pictures one-half inch square; machine automatically processed X-ray film in one hour.

Motion picture camera, for use in research and industrial processes, took five million pictures a second, ten times more than high-speed cameras produced before.

Electronic photo-flash unit that fires photographic flashes at three-second intervals was developed; camera with an effective exposure time of four hundred-millionths of a second, used in studies of electrical discharges, was described.

Aerial photographs for large area surveys were taken along straight and parallel lines in the sky through use of a position indicator working in conjunction with Shoran, war-developed navigation aid based on radio.

Automatic pilot successfully varied the altitude of a V-2 rocket in flight, furnishing the first step toward guiding the flight of rockets from the ground by radio control; diffuser of a ram-jet or "flying stovepipe" was successfully tested through use of V-2 rockets.

Flight of long-range rockets was recorded on motion-picture film through the use of an astronomer's telescope placed on the mount of an anti-aircraft gun.

Aluminum metal was obtained from kaolin clay through a process that consists of roasting the clay, digesting it with dilute hydrochloric acid, filtering to remove the insoluble silica, and adding hydrochloric acid gas to produce aluminum chloride crystals.

The common clay bentonite was used to

produce a new plastic by taking advantage of the chemical reaction between bentonite and resin-forming organic polymers.

Nickel and cobalt were successfully plated on metal without the use of an electric current by chemical reduction of nickel or cobalt salt with hypophosphite in hot solution.

Titanium was made possible as a pure metal for industrial use through an improved process that reduced titanium tetrachloride with pure molten magnesium in the presence of helium gas under pressure.

Gas for generating power and manufacturing synthetic products was produced by burning unmined coal in the ground.

Coal-burning gas-turbine locomotives were developed to use finely pulverized coal.

Optical glass for television mirrors was successfully cleaned by bombarding it with electrons under vacuum.

Glass-free porcelains, capable of withstanding heat up to 2,000 degrees Fahrenheit, were made from alumina, beryllia, zirconia and thoria.

Series of tough, serviceable new paints was produced from lactic acid, souring agent in milk.

Electronic stopwatch measured the speed of atomic particles to one thousandth of a millionth of a second and determined the energy of the charged particles in nuclear reactions.

Invisible infra-red rays, used in the same manner as in an Army snooper scope, were reported superior for examining human eyes as they do not disturb the eye under observation.

New chemical resin emulsion, when pumped with water down the well in seconds,

ary recovery of oil, was found to plug the more permeable layers from which oil has been driven and to direct the water pressure to the other layers.

Dangerous factory and mine gases were detected by an electronic ear that analyzes mixtures of two gases by measuring the speed of sound waves passing through them.

Colored leads were used to record on ordinary paper colored pictures transmitted by wire or radio waves by a facsimile process.

Clearer long-distance telephone reception resulted from use of pulse code modulation technique that, instead of transmitting a continuous speech wave, sends samples at a very rapid rate using a set of code consisting of a definite arrangement of electrical pulses.

Speedy transmission of telegrams from outlying areas resulted from installation of a push-button system at the central office that called for only one typing of the message, at the point of origin.

Low pressure system to obtain oxygen from air, developed during the war, was adapted to industrial use, including possibly getting gasoline from natural gas.

Man-made crystals successfully replaced natural quartz used in telephone circuits.

Electroplated wire that can be bent, hammered, woven and twisted without flaking was produced by electroplating quarter-inch rods, then drawing them out into fine wire.

Robot electronic egg candler utilized the differences in quantities of electronic energy absorbed to separate good eggs from bad.

Production of a powerful 3,000-watt mercury vapor lamp greatly widened possi-



**HONEYCOMB SANDWICH**—This type of panel construction has gone into the building of an experimental house by the government. The core, which is the insulating material, is shaped by special machinery to resemble honeycomb. The picture shows a plywood cover being placed over it to be bonded to the core by a highly water-resistant phenolic resin glue. (See page 397.)

bilities of application of light to chemical reactions in the so-called photo-chemical process.

Softening oil made from silica was used in making better rubber tires that resist heat, weather, chemicals and abrasion.

Large savings in sugar resulted from storage of sugar beets at near freezing temperature while awaiting processing.

Radiotelephone equipment was installed on trains, enabling passengers to telephone home or office.

Mightiest bolt of lightning recorded by instruments occurred during the summer; it contained an estimated 345,000 amperes of electricity.

#### INVENTIONS

### Thermal Process Captures Nitrogen from Atmosphere

NOTABLE and interesting inventions patented during the year include:

Fixation of atmospheric nitrogen as nitric oxide by passing the gas mixture through a bed of incandescent oxide "pebbles," further heating in the combustion chamber, then sudden cooling in a twin chamber with unheated pebbles.

Process for purifying water by electricity precipitating the germs on sand or other granular dielectric material.

Addition of methyl-phosphorus compounds to fuel treated with tetra-ethyl lead to check the unsparked ignition due to the lead, without reducing its anti-knock properties.

Use of fluorine for production of synthetic rubber with high resistance to aging effects of sunlight and to action of oil and other rubber solvents, with high elasticity at low temperatures and high tensile strength.

Oxygenless flame of very high temperature obtained from fluorine and hydrogen gases, for cutting or welding metals.

Rifle powder of high energy that consists of tiny grains of a finely pulverized high explosive such as TNT or PETN, each embedded in a pellet of more deliberately-burning smokeless powder.

Study of signal strength upon reception of radio waves of high frequency to obtain data on the relative humidity, temperature and pressure gradients of air masses between two points.

Device that measures the relative amounts of oxygen in mixture of gases by utilizing attraction of oxygen to a magnet.

Thorium extraction from phosphatic minerals containing it by exploiting the phosphoric acid released through addition of sulfuric acid.

Production of rhenium, element discovered two decades ago, from some sulfate ores by collecting the dust, washing, filtering and bringing down the rhenium in the form of an insoluble salt by addition of a soluble compound of potassium.

Production of ammonium sulfamate by mixing an excess of liquid anhydrous ammonia with sulfur trioxide in either liquid or solid form, then letting the excess ammonia evaporate.

More compact electron microscope which uses electrostatic fields instead of magnets for focusing its electron beam.

Beer of better flavor from malt left unbroken until its maximum diastase content

develops, then added quickly to the cooked starch mass.

More rapid dehydration of vegetables through simultaneous use of radiant heat and current of dry, hot air; avoidance of oxidation spoilage by removal of oxygen without which oxidizing enzymes cannot function.

Production of a series of synthetic drugs with marihuana-like action, useful in treatment of narcotic addiction; typical compound made by condensing pulegone with one of the higher benzenes in presence of phosphorus-containing catalyst.

Increased production of penicillin from a given batch of mold through the addition of a few hundredths of one per cent of phenylacetic acid.

Unwettable form of DDT with excellent film-forming properties.

Synthetic rubber with fluorine substituted for the customary chlorine.

Greater production of glycerin through use of an acidified medium that enables ordinary yeast fermentation processes to progress more efficiently.

Increase of oil-well yields through use of bacteria of the genus Desulfovibrio that enlarges flow channels by dissolving limestone, makes oil flow more freely by lowering surface tension and increases gas pressure by producing carbon dioxide.

Automatic inspection of objects for standard shape or proper size through use of pairs of phototubes that select objects as approved when a shadow is cast upon only one of the tubes.

New type of viewing screen, composed of a thin layer of image-retaining potassium chloride crystals, for use with electron microscopes, making greater enlargement possible and taking of photographs without having a plate-holder in microscope's vacuum chamber.

Light-signalling system that uses light-waves of differing frequencies at a constant intensity to transmit messages.

Fire-alarm device triggered by ultraviolet rays from the fire's flame rather than by its heat.

Photo-reproduction of text or drawings at mimeograph speed by making use of tendency of tungsten, molybdenum and related metals to turn dark without further treatment when irradiated with light between high violet and near ultraviolet.

Impregnation of paper with methylol urea, a thermoplastic resin, to prevent shrinking, swelling and warping.

Glass with high refractive index, useful for wide-angle camera lenses and microscope objectives, made by substituting germanium oxide for sand in a formula including also titanium oxide and sodium fluoride.

For production of red stained glass, introduction of the copper as vapor of copper chloride in the atmosphere over the still-hot glass.

Typewriter for Chinese characters that eliminates need for separate key and type bar for each character by arranging all the types in rows on a large cylinder rotated into alignment by pressing numbered keys.

Method for keeping a port ice-free by laying long lines of perforated pipes under the channel and pumping air through them.

#### MEDICINE

### Streptomycin Arouses Hope for TB Conquest

HOPE of a chemical conquest of tuberculosis was aroused by good results of streptomycin treatment reported from many clinics.

Initial trial of vaccination with BCG against tuberculosis was begun in the United States as part of a long-range study program.

A chemical effective against tuberculosis in guinea pigs was found in long yellow crystals extracted from a lichen popularly known as California Spanish moss.

Discovery of a prophylactic effect of penicillin against syphilis was announced.

Germs of athlete's foot and various other fungi and parasitic yeasts which cause disease in man and animals were knocked out with tomatin, new addition to the family of antibiotics, made by pressing juice from leaves and stems of the tomato plant.

Germ in a badly infected leg wound yielded a disease-fighting chemical called bacitracin, found effective against boils, carbuncles, styes and ulcers.

Chloromycetin, new penicillin-like remedy, was found effective against experimental ricketsial and virus infections.

Other germ-fighters include: grisein, from the same soil organism as streptomycin and for use with it; aerosporin, from bacterium in some soils and tap water; modified form of gramicidin, for use against surface infections; and compounds found in radish seed, garlic, cinnamon oil and 213 species of mushroom.

Experiments with mice revealed that pneumonic plague was controlled by streptomycin in 90% of the cases.

New chemicals tested as weapons against cancer were: KR, widely heralded Soviet discovery; radioactive gold; ethyl carbamate or urethane; a synthetic substitute for vitamin K; sodium fluoride, iodacetate acid and malonic acid; and an old Indian remedy, podophyllin.

Sodium fluorescein, dye that glows under ultraviolet light, was used successfully to show a surgeon the extent of cancer tissue to be removed.

Two blood tests for cancer were announced, one with the dyes, brilliant cresyl blue and methylene blue, and the other by inspection of serum under ultraviolet light.

Spread of cancer cells, called metastasis, was attributed to lack of adhesiveness of the cell surface.

Chemical in mother's milk that causes breast cancer in mice was isolated.

Evidence of a relation between breast cancer and over-femininity, in the sense of unopposed action of female hormones, was found.

Jackson Memorial Laboratory at Bar Harbor, Me., famous genetic and cancer research center, was destroyed by forest fire.

Clue to why cancer kills was found in its action of robbing the body of its stores of nitrogen and holding it trapped so the rest of the body cannot use it.

Discovery that marine bacteria can decompose cancer-causing petroleum hydrocarbons brought the suggestion of their possible role for preventing or curing cancer.

A red blood cell extract was developed and showed promise for use both as preventive and remedy for erythroblastosis, often

fatal disease of new babies born to mothers with Rh negative blood.

Tyrosinase, which turns potatoes black, and another chemical in urethane, were reported to have some benefit in treatment of leukemia.

New synthetic pain-relieving drug known variously as amidone, dolophine and 10820, was reported two to four times as effective as morphine, but also capable of causing addiction.

A morphine derivative, metopon, found less addicting than morphine, was made available for pain relief in cancer patients only and under restrictions to prevent its misuse.

Ten-year survey of male sex habits was reported.

A new operation and a special instrument were devised for freeing one of the heart's valves of binding scar tissues.

Blood-shunting operation in which the great cardiac vein was made to do the work of the heart's artery was developed for relief of coronary thrombosis and sclerosis.

Isolation of two more blood fractions, an iron-copper carrying chemical and another which separates as a mercury salt, was announced.

Two anti-influenza chemicals LL47 and apple pectin, effective in laboratory experiments, were reported.

New inroads against tooth decay include: rhubarb mixed with lemon juice to protect teeth against the acid's erosive action; plan for mass control of caries at the source by adding glycerol aldehyde (simple, tasteless chemical) to all sugar at the refineries to check fermentation and acid formation from sugar as eaten; tryptophane, an amino acid, as a possible decay preventive; treatment of children's teeth twice a year with sodium fluoride.

Remedy for intestinal paralysis was found in a poisonous war gas, di-isopropylfluorophosphate (DFP).

Vitamin C and the amino acid, histidine, given together to cause release of histamine in the body were announced as effective treatment for serious conditions, including gangrene, in which blood circulation is impaired.

Improved treatment for infantile paralysis followed discovery that bulbar poliomyelitis takes five different forms, each requiring specific treatment.

First direct observation of protein synthesis outside the animal body, of importance in cancer study, was achieved with radioactive sulfur.

Body chemical called histamine was found to transform certain cells of the body from their resting state into active germ-eaters.

Antimalarial 100 times as powerful as quinine was extracted from the leaves and roots of a Chinese plant, *Dichroa febrifuga*.

PAB, used in ridding livestock of parasitic worms, had a sulfa-like action against the exceedingly minute germs called Brucella; chemical from mold found in soil of cattle inclosure showed promise as remedy for undulant fever.

Malaria germs were grown outside a human or animal body, offering a new technique for testing antimalarial drugs.

A dual photoelectric device clipped to the ear aided infantile paralysis patients by giving doctors an actual and continuous measurement of the oxygen in the blood.

Cyanine dyes and chemicals called piperazines were announced as promising for treat-



**ELECTRIC RESPONSE**—Dr. Lorrin A. Riggs, psychologist at Brown University, measures the electric current on the eye of his co-worker, E. Parker Johnson, by means of an electrode inserted in a contact lens. In this way it is possible to measure the eye's visual sensitivity. (See SNL, Nov. 29.)

ment of the tropical disease, filariasis.

One type of hardening of the arteries, atherosclerosis, was reported linked with the physical state of fat in the blood.

The anti-war gas chemical, BAL, was found effective in overcoming gold poisoning in arthritis patients getting gold salts treatment and also lead poisoning.

One of the nitrogen mustard war gases brought improvement in the incurable chronic disease, Boeck's sarcoid, but cannot yet be classed as a cure for the condition.

Quick antidote to the occasional hemorrhagic effect of heparin, anti-blood clot chemical, was discovered in protamine, a fish-protein chemical.

Blood chemical, hemin, was found to prolong insulin's action.

New fat hormone produced by the adrenal glands was discovered responsible for moving fat from liver reserves during starvation.

Peacetime national blood program for collection and distribution without charge of blood, plasma and blood fractions used to treat and prevent disease was announced by the American Red Cross.

An official long range research program on the after-effects of the atom bomb among Japanese was started.

A dye, toluidine blue, was found effective in laboratory tests in controlling the bleeding of radiation sickness.

New atomic danger, plutonium poisoning or "plutonium," was found to cause greying hair, liver damage and bone cancer in laboratory animals; treatment with a harmless metal, zirconium, to displace the poisonous element was reported effective.

Radioactive sex hormone was made for the first time by using carbon 14 from the atomic pile to prepare synthetic male hormone.

Radicative germs and radioactive penicillin were prepared so that scientists could trace both the germs and the drug through the body and determine, if possible, how the body's immune mechanisms work.

A new drug, dibenamine, and pentobarbital may avert death from shock following severe bleeding, it was reported.

Patients with liver disease and abdominal dropsy were reported to have increased amounts of an anti-diuretic substance in the blood.

A fat mobilizing substance or hormone was discovered in the urinary excretion of fasting animals.

Para-aminosalicylic acid, PAS for short, proved effective in checking tuberculosis in guinea pigs, and clinical trials were started.

Microwaves, such as used in radar, were introduced as medical agents better than diathermy for heating internal tissues.

The Nobel prize in medicine and physiology was awarded to Dr. Carl F. Cori and his wife, Dr. Gerty T. Cori, Washington University School of Medicine, St. Louis, for their discovery of what happens to sugar and starch in the body, and to Dr. Bernardo A. Houssay, of Buenos Aires, for his discovery of the relation between the pancreas and the pituitary gland.

#### PSYCHOLOGY AND PSYCHIATRY

### Hypnotizing Drug Used for Relief of Morbid Fear

PENTOTHAL, hypnotizing drug that helped soldiers recover from combat-induced mental sickness, was used for rapid relief of a civilian from his morbid fear of closed spaces.

New, safer form of electric shock treatment in which each pulse lasts only one-half to one-thousandth of a second was successful against depression; shock by weak electrical current followed by a deep, dream-like sleep was found useful.

Two personality tests, Rorschach ink-blot test and Minnesota Multiphasic Personality Inventory, were used to separate quickly curable mental patients from resistant ones.

Lack of sleep for five days and nights made a healthy young man temporarily "see things," laugh and talk crazily, and show other symptoms of the serious mental disease, schizophrenia, pointing to a relation between the two conditions.

Mental patients were found to have an average intelligence quotient eight points below the normal expectancy of 100; alcoholics and neurotics rated highest intellectually, epileptics and syphilitics among the lowest.

Inability to form new conditioned reflexes was used as a clue to serious brain damage, and to distinguish between functional disturbances and organic disturbances.

Children displayed more intelligence after treatment with glutamic acid.

Chemical constitution you inherited from your parents plus the environment in which you live was reported to determine whether you would become an alcoholic; alcoholic addicts were declared subconsciously to enjoy being treated badly.

Smell is not a chemical sense but is due to infrared radiation from the sense organ, according to a theory confirmed by experiments; odorous substances are those capable of absorbing radiation of the critical wavelengths—eight to 14 microns.

Tapping of electric currents from the eye itself was found to be an objective method for measuring visual sensitivity uncomplicated by what happens in the brain's visual centers.

Possibility that sounds may be used to produce an illusion of sight for the purpose of guiding a pilot into an airport was the outcome of war research.

Simpler instrument panels with fewer, less confusing dials and knobs easier to reach and manipulate also resulted from these programs.

#### GENERAL SCIENCE

## Ten Top Science Advances

► THE TEN most important advances in science made during 1947, as picked by Watson Davis, director of Science Service, are:

1. Discovery that smell is detected by infrared radiation absorbed by odor material reaching the nose.

2. Pilotless plane that crossed Atlantic untouched by human hand at controls.

3. Attempts at artificial rainmaking through sprinkling dry ice or water on clouds under certain conditions.

4. Synthesis of protein in long-chain molecules, promising new plastics of medical and industrial importance.

An auditory afterimage was found to follow a buzzing sound of high intensity, causing familiar sounds to have a strange metallic quality.

A person's ear was reported to be more sensitive to interruptions in sound than his eye to a flicker in light, being capable of noticing the difference between a continuous noise and one interrupted 1,000 times per second; this research is important in new telephone systems.

Sight, except for responses to light, must be learned, it was shown through studies with baby chimpanzees raised in darkness and humans born blind in whom sight was restored.

Master hearing aid that will suit almost all deafened persons was made possible by war research on noise and communications.

Learning under intense pressure tends to be narrow and rigid so that a need to adapt under changed conditions results in frustration; this finding from animal experiments is believed to explain the psychological difficulties of men and nations.

Most accurate prediction of a man's leadership comes from the men who work with him, it was found, as intelligence, mechanical aptitude and personality tests fail to predict ability to command in combat.

Lefthandedness can be predicted while the person is still a baby from study of his posture in motion pictures made at monthly intervals, it was reported.

Punishment may stamp in the behavior for which punishment is given, it was indicated by studies in which rats punished for running often ran faster.

People begin to lose their strength at the age of 25, measurements of hand strength showed.

Although school books intended to build a child's vocabulary only introduce about 500 new words a year, the average child was found to add 5,000 new words to his vocabulary every year.

Two-thirds of the mothers bringing their babies regularly to a health clinic, and themselves learning a realistic and tolerant attitude toward infant behavior, reported their babies had no unapproved habits.

*Science News Letter, December 20, 1947*

5. Interconversion of proton and neutron fundamental particles and smashing of many more elements yielding new isotopes and transmutations in world's highest voltage synchro-cyclotron.

6. Largest display of sunspots in over a century.

7. Use of streptomycin in tuberculosis treatment.

8. Development of jet bombers and higher speed jet planes.

9. Discovery of 10,000 year-old Tepexpan man in Mexico.

10. Camera that makes finished photoprint in one-step process.

*Science News Letter, December 20, 1947*

## Do You Know?

Alfalfa may some day be grown as a source of food for humans; it is rich in proteins.

The frost that forms on the freezing compartment of an electric refrigerator can be melted and used where relatively pure water is required.

Four methods of air disinfection for hospitals are recommended: ultra violet radiation, chemical disinfection with sprays, dust suppression, and ventilation.

Starting from sea-level, the temperature of the atmosphere drops steadily up to an altitude of about 12 miles, then remains constant for several miles, rising at an altitude of 36 miles and later dropping again.

Butyl alcohol, a possible fuel for automobile engines, is obtained from corn-cobs by a new process in which the cobs are treated with an acid, yielding glucose, or corn sugar, and xylose, once called wood sugar.

#### ENTOMOLOGY

## New Unwettable DDT Will Provide Poisonous Film

► MOSQUITO "wrigglers" coming to the surface to breathe, also their mothers coming down to lay another clutch of eggs, are in for worse DDT trouble than ever. For covering the water surface there is very likely to be a persistent, poisonous film of a new "hydrophobic" DDT.

This does not mean that the mosquitoes will get hydrophobia; it merely means that the etymology of this new entomological woe indicates that the compound "hates water", in the sense that it cannot be wetted and thus washed out or sunk.

This new, unwettable form of DDT, on which U. S. patent 2,430,288 has been issued to a du Pont chemist, Albert L. Flenner of Wilmington, Del., is prepared by hooking the DDT molecules up to molecules of stearylamine, which are long-tailed affairs built somewhat like soap molecules, then mixing to a paste with tricalcium phosphate. Dried and re-powdered, this forms highly fluid dust, the particles of which stick to each other but will not stick to water. Hence their excellent film-forming properties.

*Science News Letter, December 20, 1947*

## ASTRONOMY

# Patches on Distant Star

**Light and dark areas bearing some resemblance to sunspots have been observed for the first time on a star beyond the solar system.**

► LIGHT and dark patches bearing some resemblance to sunspots have been observed for the first time on a star beyond the solar system, Dr. Gerald Kron, assistant astronomer in the University of California Lick Observatory, reports.

Actually, this is the first time surface features of any star beyond the solar system have been observed.

The patches—Dr. Kron says he is not yet prepared to say they are "star spots"—were observed on the smaller, sun-like star of AR Lacertae, a double star of the seventh magnitude. This star is in the Northern constellation of Lacerta, the lizard, found high in the northwest these winter nights.

The observations were made by means of photoelectric photometry, in which light from a star gathered in a telescope is translated into an electrical current by means of a photocell. This electrical current can be amplified and measured, giving an accurate measurement of the light received.

Astronomers call AR Lacertae an eclipsing variable, that is, a double star system in which the two components are constantly eclipsing each other when observed from the earth. One star is of the same type as the sun and about twice the sun's size. The other is a cooler star about three times the size of the sun. The two stars are about two million miles apart, 160 million light years from the earth, and revolve so rapidly about each other that the larger one totally

eclipses the smaller star once every two days.

During these total eclipses, Dr. Kron measured the amount of light received from the larger star. When the two stars were entirely separated, Dr. Kron measured the total light received from both stars. The amount of light received normally from the smaller star alone was determined by subtraction.

The astronomer noted a light variation for the whole system of about 10%. Having determined that there was no variation in the light received from the larger star when it was totally eclipsing the smaller one, he deduced that the variation must originate only from the small star. Eventually, he found the light variation in the smaller star to be about 20%.

Studies of these variations during five years of research, 1938 through 1940, and 1945 and 1946, showed that they must be caused by the appearance and disappearance of large bright and dark patches on the surface of the smaller star.

The patches form and dissolve, appear and disappear around the edge, and are eclipsed by the larger star, Dr. Kron said.

His evidence so far will not support the idea that these are "star spots" similar to sunspots. He said, however, that some similar phenomena may be operating on "suns" beyond the solar system, and that this might be such an instance.

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core. This gives additional strength.

The covering sheets attached to the core may be thin metal, plywood, veneer or some other sheet material. Aluminum is successfully used. With modern glues, these covers can be bonded on so firmly that the glue joint may be stronger than the cover.

A special feature of sandwich construction is its strength. The panels, which may vary in thickness from a fraction of an inch to many inches, are stiff as well as strong, and can be used in a small house without supporting frame. Floors, partitions and ceilings may also be sandwich panels. Houses of sandwich-panel sidewalls will be warm if the proper types of panelling are selected.

The building erected by the government agency is frameless. Panels are held together by temporary joints so that different types of panelling can be substituted for tests. The house rests on a concrete foundation. In one room, without basement, the sandwich floor panels contain copper piping in the core for hot water heating by what is known as radiant heat. In another room, a wood floor is laid on sleepers over a concrete floor in which radiant heating piping is embedded.

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## METALLURGY

## Coat Nickel and Cobalt on Metal Without Electricity

► NICKEL and cobalt have been successfully plated on metal surfaces without the use of an electric current by a new process developed by the National Bureau of Standards.

The action is brought about by chemical reduction of a nickel or cobalt salt with hypophosphite in hot solution. The reaction is catalytic. No plating takes place unless certain metals, such as steel or nickel, are introduced into the bath. The reduction then occurs only on the surface of the immersed metal with the production of an adherent coating of about 95% purity.

These coatings are of good quality, sound though brittle, and are usually bright. As they can be made as hard as tool steel, the method may be useful where hard, wear-resistant surfaces are required. The process is particularly applicable to the plating of irregular surfaces.

The development is the work of Abner Brenner and Miss Grace E. Riddell of the Bureau's staff.

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## ENGINEERING

## Sandwich-Panel Houses

► SANDWICH-PANEL construction may soon enter the home-building field. An experimental three-room unit, just erected at Madison, Wis. by the U.S. Forest Products Laboratory, is designed to test the value of this type of factory-built material in housing.

Sandwich panels, first used in aircraft, are made of two thin sheets of wood or metal with a thick layer of light insulating material between, the whole being firmly bonded together with a

special glue. The inner layer, called the core, may be a light wood such as balsa, or it may be paper or even metal.

The favorite type is the honeycomb sandwich. In this the paper or other material in the core is shaped by special machinery to resemble the honeycomb formed by bees. This construction gives special strength and, because of the enclosed air spaces, provides heat insulation. One type of honeycomb construction uses very thin aluminum in the



### Will Toward Peace

★ PEACE ON EARTH was the promise that sounded through the sky on the first Christmas night, according to the Bible narrative. That to achieve it we must be men of good will is a condition which we are all too prone to forget. Indeed, a more recent translation makes the condition seem even more difficult, for it reads: "Peace on earth to men that are God's friends."

How shall we show ourselves men of good will? How become God's friends?

To act with good will must surely mean that we shall act in accordance with God's will. Any theologian will tell us that. Dispute begins when the theologians proceed to give us their varying formulae for learning what God's will is.

Leaving discussion of such matters to those competent in them, let us see if there is any common ground on the level of the natural world whereon we may grope our own way towards peace. If we accept the dogma that God made the

world, then surely it follows that the normal course of nature is one expression of his will. To act in accordance with that will, thus expressed, man as an inhabitant of the natural world should integrate his life with the general life of his fellow-creatures; in a word, man should become an ecological being.

He should, for example, be content to take what he needs for food and clothing and shelter, neither killing his lesser brethren "just for fun" nor piling up acquisitions in sheer ostentation. He should take care that the trees he cuts down are replaced with others, that the soil he plows and plants is well treated so that it will stay where it is and not flee down gullies or into the wind, that our rivers are made clean homes for fish, not mere giant sewers.

That we are not living as natural men of good will we scarcely need to be told again. We have been exploiters

rather than users, wasters rather than gainers. Arrogating to ourselves the title of lords of the universe, we have behaved in altogether too lordly a manner.

True, in the beginning man was bidden to subdue the earth, and given "dominion over the fish of the sea, and over the fowl of the air, and over every living thing." But we have misinterpreted dominion to mean tyranny and wanton waste. The evil consequences of our course, in want and war, are now spread plain before us.

Ecologists, like the prophets of old, tell us these things every day, and make it clear what we can expect if we persist in our stiff-necked selfishness. Like the milder prophets, they also tell us that there is yet time to repent and return to the right path toward peace. There is time, but there is not much time.

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### MEDICINE

## Test for Hypertension

Curing of high blood pressure due to adrenaline-producing tumors will be possible by surgical removal of the growth following diagnosis with this new test.

► A NEW test for high blood pressure which gives doctors "the rare opportunity of truly curing" the condition is announced by Drs. Marcel Goldenberg and Henry Aranow, Jr., of New York and Dr. C. Harrison Snyder of Salt Lake City in the *Journal of the American Medical Association* (Dec. 13).

The high blood pressure for which the test was devised is that due to tumors which produce adrenaline, or epinephrine. These tumors may be located on the part of the adrenal glands that normally produces adrenaline, or they may be located elsewhere in the body. Surgical removal of the tumor cures the condition.

A 13-year-old girl and a 42-year-old woman have already been picked out by the test and cured by removal of tumors.

In high blood pressure from this cause, adrenaline is found circulating in the blood. It is the only clinically important high blood pressure known to be due to adrenaline circulating in the blood.

The condition probably occurs more often than is realized. The diagnosis has been difficult to make, because the

symptoms are so much like those of the high blood pressure doctors call "essential" or "malignant." X-rays frequently fail to show the tumor before operation.

The new test for this high blood pressure is made with a relatively new drug, known as 933F. Its chemical name is piperidylmethyl benzodioxane. It was first prepared by Drs. E. Fourneau and D. Bovet of the Pasteur Institute in France.

This new drug blocks the action of adrenaline. When injected into the veins of a patient with high blood pressure, his blood pressure promptly falls if it was high because of adrenaline from the tumor. If his high blood pressure is due to another cause, it goes still higher when 933F is injected. Persons with normal blood pressure also show a heightened blood pressure after injection of 933F.

The effect of 933F on the blood pressure is temporary, lasting about 15 minutes.

*Science News Letter, December 20, 1947*

If copper or brass strainers are used for citrus or tomato juices the vitamin C content of the juices may be destroyed.

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**THE BOOK OF NATURE HOBBIES**—Ted Pettit—*Didier*, 280 p., illus., \$3.50. Study information and hints on many worthwhile collections and activities for outdoors.

**CAVES OF THE UPPER GILA AND HUECO AREAS IN NEW MEXICO AND TEXAS**—C. B. Cosgrove—*Peabody Museum of American Archaeology and Ethnology*, Vol. XXIV—No. 2, 181 p., colotype figures unpaged, illus., paper, \$6.25.

**THE CHEMISTRY AND TECHNOLOGY OF WAXES**—Albin H. Warth—*Reinbold*, 519 p., illus., \$10.00. A convenient reference manual.

**CONGENITAL MALFORMATIONS**—Douglas P. Murphy—*Lippincott*, 2nd ed., 127 p., \$5.00. Study of parental backgrounds likely to lead to physical and mental abnormalities in offspring.

**DIRECTORY OF COMMERCIAL AND COLLEGE LABORATORIES**—Natl. Bur. of Stand., Misc. Publ. M187—*Govt. Printing*, 65 p., paper, 30 cents.

**ENERGY UNLIMITED: The Electron and Atom in Everyday Life**—Harry M. Davis—*Murray Hill*, 273 p., illus., \$4.00 New advances and inventions in applied physics which are affecting modern life.

**EXCAVATION OF A YOKUTS INDIAN CEMETERY**—Edwin F. Walker—*Kern County Historical Soc.*, 57 p., illus., paper, \$1.50.

**FAMILY SKELETONS**—David D. Whitney—*Univ. of Nebraska*, 284 p., illus., \$4.00 Descriptions of about 250 abnormal and undesirable traits which appear to be heritable.

**FATIGUE AND IMPAIRMENT IN MAN**—S. Howard Bartley and Eloise Chute—*McGraw-Hill*, 429 p., \$5.50. The authors call attention to psychological as well as physiological aspects of fatigue.

**GREAT MEN OF MEDICINE**—Ruth Fox—*Random House*, 240 p., illus., \$2.50. The careers and discoveries of men who revolutionized medicine, from Vesalius to the present.

**HIGH FREQUENCY MEASURING TECHNIQUES USING TRANSMISSION LINES**—E. N. Phillips, W. H. Sterns, N. J. Gamara—*Rider Publ. Co.*, 58 p., paper, \$1.50.

**INDUSTRIAL EXPERIMENTATION**—K. A. Brownlee—*Chemical Publ. Co.*, 151 p., \$3.75. Statistical methods, applied to large-scale industry.

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**AN INTRODUCTION TO PLANT ANATOMY**—Arthur J. Eames and Laurence H. MacDaniels—*McGraw-Hill*, 2nd ed., 427 p., illus., \$4.50. Fundamentals for a first course in botany.

**LABORATORY CHEMISTRY**—William E. Price—*World Book*, 133 p., illus., paper, 92 cents. Manual of experiments for high school.

**MANUAL FOR PROCESS ENGINEERING CALCULATIONS**—Loyal Clarke—*McGraw-Hill*, 438 p., \$6.00.

**MANUAL OF QUANTITATIVE ANALYSIS**—Donald R. Clippinger—*Ginn and Co.*, 339 p., \$3.50. Basic principles presented as a laboratory workbook.

**MICHIGAN WILDLIFE SKETCHES**—G. W. Bradt and Charles E. Schafer—*Michigan Department of Conservation*, unpaged, illus., paper, 25 cents. Profusely illustrated with sketches of Michigan's animal life.

**MILK AND DAIRY PRODUCTS**—Lincoln M. Lampert—*Chemical Publ. Co.*, 291 p., illus., \$7.00. Various aspects of dairy science, presented in non-technical language.

**THE NAVAHO**—Clyde Kluckhohn and Dorothea Leighton—*Harvard Univ.*, 258 p., illus., \$4.50. A timely study of the life, beliefs and language of a people for which President Truman has just asked Congress to provide.

**PLYWOOD: What It Is—What It Does**—Louis H. Meyer—*McGraw-Hill*, 250 p., illus., \$3.50. For engineers, architects, industrial designers and others.

**PYROTECHNICS**—George W. Weingart—*Chemical Publ. Co.*, 2nd ed., 244 p., illus., \$7.00.

**RESEARCHES OF THE DEPARTMENT OF TERRESTRIAL MAGNETISM: Vol. VIII—Land and Ocean Magnetic Observations, 1927-1944**—W. F. Wallis and J. W. Green—*Carnegie Inst.*, 243 p., paper, \$1.25; cloth, \$1.75.

**RESEARCHES OF THE DEPARTMENT OF TERRESTRIAL MAGNETISM: Vol. XII—Carnegie Inst.**, Publication 175, 397 p., paper, \$1.85. Part I covers "Ionospheric Research at College, Alaska: July, 1941-June, 1946;" Part II surveys "Auroral Research at College, Alaska: 1941-1944."

**A STUDY OF THE FEI BANANA AND ITS DISTRIBUTION WITH REFERENCE TO POLYNESIAN MIGRATION**—L. H. MacDaniels—*Bernice P. Bishop Museum*, Bulletin 190, 56 p., pictures unpaged, illus., paper, \$1.00.

**SUCCESSFUL PART-TIME FARMING**—Haydn S. Pearson—*Whittlesey House*, 322 p., illus., \$3.00. Tells what equipment is necessary, and which crops and crafts are adapted to part-time farming.

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**TERMINAL RESEARCH REPORTS ON ARTIFICIAL LIMBS**: Covering the Period from 1 April 1945 Through 30 June 1947—Committee on Artificial Limbs, *National Research Council*, 95 p., illus., paper, free from publisher at: 2101 Constitution Ave., N. W., Washington, D. C.

**TIME AND THERMODYNAMICS**—A. R. Ubelohde—*Oxford Univ.*, 110 p., \$2.25. The trend of events in time, as measured by the concept of entropy.

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**ZACULEU**: Restoration by United Fruit Company—*Middle America Information Bureau*, 31 p., illus., paper, free from publisher at: Box 93, Lenox Hill Station, New York 21, N. Y. Report on archaeological explorations and research on this Mayan community in Guatemala.

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## BIOCHEMISTRY

### Atom Explosion Does Not Affect Life on Bikini

#### See Front Cover

► A NAVY expedition to Bikini last summer found little change in the life of the island. Seemingly ignoring man's destructive weapon, the atom bomb, the giant man-killing clam on this week's cover of the SCIENCE NEWS LETTER is growing on a Bikini reef. The clam *tridacna*, is approximately two feet across and was photographed underwater. Few people have seen it alive; it is the dread of pearl divers because it is likely to clamp onto their leg, causing drowning. (See also p. 391 and SNL, Nov. 29).

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A giant healthy sponge found a few years ago in Tortugas had within it over 16,000 shrimp and thousands of lesser animals, all living on food in the water sucked in by the sponge to get food for itself.

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